6.0 ASSESSMENT

This section presents the results of the five-year review process, particularly with respect to three questions:

- Have conditions external to the remedy changed since the remedy was selected?
- Has the remedy been implemented in accordance with decision documents?
- Has any risk information changed since the remedy was selected?

6.1 Conditions External to the Remedy

The primary factors which are key to ROD implementation yet external to the remedy are changes in land use, exposure pathways, and Site conditions.

Land Use

Land use at the Site has been industrial since Carrier began operations. All surrounding land has been zoned by the Town of Collierville as general industrial or general commercial. Future land use in this area is expected to remain industrial.

Pathways

Exposure pathways at the Site are the same as those identified in the initial RI/FS process: dermal contact and ingestion of surface soil, and domestic use of groundwater. However, domestic consumption of TCE-contaminated groundwater has been eliminated as a pathway through treatment at Water Plant #2. These pathways are not expected to change in the future.

Site Conditions

Some development has occurred adjacent to the Carrier Site due to roadway improvements on Byhalia Road, and construction of Winchester Road along the southern perimeter of the

property. However, physical conditions on the property — and most importantly in the impacted areas — remain the same.

Site hydraulic concerns were evaluated in 1994 and again in 1996/1997. Conclusions regarding groundwater hydrogeology and the subsequent effectiveness of Water Plant #2 as a containment system are consistent with previous data. No changes are anticipated.

6.2 Remedy Implementation and System Operations

Remedy implementation and system operations evaluated during this five-year review were deemed to be in accordance with the ROD and on-track for meeting Site remedial goals.

Site Controls

Site controls are adequate. Fencing and limited access to remediation areas (the most highly contaminated areas onSite) prevent unauthorized contact with contaminated media. Zoning restrictions in the Town of Collierville indicate that future land use will be consistent with ROD cleanup standards.

Remedy Performance

As discussed in previous sections, treatment systems onSite are functioning as designed. Since system modifications were made in 1996, mass removal at the NRS area have been decreasing steadily. Mass removal rates at the MPA have also been tailing off since 1996. Over 14,000 lbs TCE have been removed from the CAC Site since system installation. Moreover, sampling performed during 1995/1996 indicated that only one small area at NRS exceeded the TCE soil cleanup criterion. Soil addressed by the MPA system has not been sampled to date.

Decreases in TCE concentrations in MW-31 since the RI indicate that mass contributions to the Memphis Sand from shallow groundwater have been significantly reduced, by at least one order-of-magnitude, since the RI.

The treatment system at Water Plant #2 is functioning as designed; TCE is being removed to concentrations below the MCL by the air stripper system. Data show mass removal rates are increasing, due to both the increasing contaminant concentrations and the increasing flow rates quantified at Water Plant #2. The municipal wells are providing complete containment for the TCE plume, as evidenced by the absence of TCE in downgradient monitoring points.

Adequacy of System O&M

The five-year review indicated that O&M for the NRS and MPA are adequate at the Site. O&M requirements at Water Plant #2 need to be discussed with the Town of Collierville to ensure responsibilities are clearly defined.

Optimization ¾ SVE Systems

System optimization at the NRS and MPA have been an integral part of operations, and documented by the system modifications made since startup. At the NRS, sampling proposed for late 2000 will provide information as to whether the 0.533 mg/kg goal has been achieved given operational changes since 1996, the last sampling event. If the RAO has been achieved, remedial actions in the NRS will be terminated.

Sampling conducted in the MPA area during late 2000 will be used to target vapor extraction efforts on recalcitrant zones, including valving off less-contaminated areas and enhancing recovery through shallow-zone venting. Optimization based on current soil data is expected to enhance mass recovery in this area.

Optimization ¾ Water Plant #2 and Containment System

The hydraulics of the containment system at Water Plant #2 have been evaluated twice since the installation of the treatment system in 1990. Data indicate that containment is achieved under the operating conditions that have been in place since the early 1990s. Mass removal rates are increasing due to increasing contaminant concentrations in raw water. These increasing concentrations are likely indicative of peak contamination that has migrated from the source area since the late 1980s and early 1990s, when shallow groundwater TCE concentrations were at the highest levels.

Peak concentrations are anticipated at the Water Plant #2 wellheads for several years, given initial concentrations near the source area. However, given that source area actions were initiated during 1995, and source area groundwater concentrations had already started to decline during 1994/1995, it is reasonable to expect that concentrations will rise and peak at Water Plant #2 sometime during the next five to ten years, and then start to decline as cleaner groundwater (resulting from source control actions at the MPA) reaches the municipal well field.

Once peak concentrations attenuate, however, groundwater conditions are expected to be diffusion limited (i.e., limited by mass transfer from the aquifer matrix into groundwater). Residual mass in groundwater is expected to be concentrated in finer-grained, less transmissive sediments at the top of the Memphis Sand aquifer. Mass transfer rates, therefore, will vary with aquifer heterogeneities, and TCE flushing from beneath the former source areas will require a long period of time.

Current production data indicate that Water Plant #2 is operating at or near capacity, with average pumping rates of 1.1 MGD and a maximum design extraction rate of 1.4 MGD. If the Town increases production capacity significantly, the containment system's total mass removal

at Water Plant #2 will increase. Increasing mass removal by installation of another well at Water Plant #2, for example, may shorten overall travel times from the source area to the Town wells; the actual travel times will depend on the well location. Over the long term, however, once concentrations drop and contaminant transport is limited by diffusion, additional pumping will have little or no effect on mass removal.

Optimization of the groundwater remedy, therefore, is best accomplished by completing the source control action at the MPA, and eliminating future contributions to Memphis Sand groundwater.

Early Indicators of Potential Remedy Failure

No early indicators of potential remedy failure (e.g., equipment breakdowns) or changes in the scope of operations were identified.

O&M Costs

O&M costs have been low, and are expected to remain low. Costs are comparable to other sites using SVE and air stripping as remedial technologies.